# A new species of Microsphecodes from Peru, with notes on the classification of the genus (Hymenoptera: Halictidae).

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# A new species of *Microsphecodes* from Peru, with notes on the classification of the genus (Hymenoptera: Halictidae)

Michael S. Engel[1]

**Abstract.** A new species of the cleptoparasitic bee genus *Microsphecodes* Eickwort & Stage (Halictinae: Halictini) is described and figured from Amazonian Peru. ***Microsphecodes stenochorus*** Engel, new species, is closest to *M. kathleenae* (Eickwort) and *M. russeiclypeatus* (Sakagami & Moure) but may be distinguished by coloration and propodeal sculpturing. *Microsphecodes* consists of two groups of divergent morphologies and these are newly considered as distinct subgenera: *Microsphecodes s.str.* and ***Baeosphecodes*** Engel, new subgenus. Provisional keys to species of *Microsphecodes* are provided.

## INTRODUCTION

*Microsphecodes* Eickwort & Stage is one of four New World genera of cleptoparasitic halictine bees, the others being *Ptilocleptis* Michener, *Sphecodes* Latreille, and *Nesosphecodes* Engel (Eickwort & Stage, 1972; Michener, 1978, 2007; Engel, 2006a). *Microsphecodes* was initially placed as a subgenus within *Sphecodes*, but Michener (1978) elevated the group to generic status. The cosmopolitan, species-rich, and heterogeneous *Sphecodes* includes several distinctive groups that have at times been considered subgenera (*e.g.*, Michener, 1978), and many of these should be once again resurrected and perhaps some elevated to generic rank as the current retrograde system is unsatisfactory. Sadly, our knowledge of much of the Neotropical fauna of cleptoparasitic Halictini is in desperate need of revision and a robust, comprehensive phylogeny is lacking. Habermannová *et al*. (2013) have provided a laudable initial foray into the phylogeny of Sphecodina. These authors have recovered several distinct groups (*e.g.*, *Drepanium* Robertson, *Proteraner* Robertson), particularly noting the basal positions of

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*Austrosphecodes* Michener and *Microsphecodes*. In their analyses, *Austrosphecodes* was paraphyletic to *Microsphecodes*, suggesting that the former should be resurrected [Michener (2007) did not recognize any subgenera in *Sphecodes*], elevated to generic rank, and segregated into additional genera once the extensive South American fauna is revised. Clearly much remains to be done on the classification and phylogeny of the Sphecodina.

*Microsphecodes* has hitherto included nine species (Table 1), although there are likely at least another three undescribed species (not including the one discussed herein). Eickwort & Eickwort (1972) provided an account of the biology of the type species, *Microsphecodes kathleenae* (Eickwort) in Costa Rica, while Michener *et al*. (1979) provided data for two further species in Colombia. Here I report on a new species of *Microsphecodes* recently recognized from material collected in Amazonian Peru (Fig. 1). It is unknown whether this species is the same as the one alluded to by Eickwort & Stage (1972) from Peru, as they did not indicate a repository for the individual they had examined.

Eickwort & Stage (1972) and Engel (2006a) emphasized the distinctiveness of the two groups of bees classified in *Microsphecodes* and the latter discussed reasons why this may warrant segregation of these taxa into two subgenera. Following up on that argument, I herein propose a subgeneric classification for *Microsphecodes*, recognizing that once the classification of Sphecodina has been resolved some of these may be more suitably treated as distinct genera. In addition, I have provided tentative working keys to the species of *Microsphecodes*. These are admittedly imperfect and superficial (relying heavily on coloration), and likely to be greatly altered in future revisions of the genus, but are meant to serve as an initial basis for stimulating work in the group and will therefore hopefully be of some utility.

## MATERIAL AND METHODS

The holotype female is deposited in the Museo de Historia Natural, Universidad Nacional Mayor de San Marcos, Lima, Peru (MUSM). The new species was compared with specimens in the Division of Entomology, University of Kansas Natural History Museum of all of the described species of *Microsphecodes s.str*., including the type series of *M. kathleenae*, *M. trichommus* Michener, and *M. truncaticaudus* Michener. The morphological terminology employed is adopted from that of Engel (2001) and Michener (2007), while the format for the description follows those of Engel (2006a, 2006b, 2006c, 2011). Photomicrographs were taken with a Canon 7D digital camera attached to an Infinity K-2 long-distance microscopic lens, and measurements were prepared using an ocular micrometer with an Olympus SZX-12 stereomicroscope.

## SYSTEMATICS

### Genus *Microsphecodes* Eickwort & Stage

DIAGNOSIS: Small, cleptoparasitic halictine bees with generally fine punctation and sparse setation; head, mesosoma, legs, and metasoma usually with extensive areas of yellow, orange, testaceous, or ferruginous coloration. Head broad; clypeus 2.8–4.5 times wider than long, sometimes with faint longitudinal depression. Mandible simple (*i.e*., without subapical teeth). Labrum with transverse basal elevation, distal process broadly rounded. Hypostomal bridge sclerotized anterior to anterior angles

**Table 1.** Species diversity of *Microsphecodes* Eickwort & Stage (updated from Engel, 2006).

| Species | Distribution |
|---|---|
| *Microsphecodes s.str.* | |
| *M. kathleenae* (Eickwort) | Costa Rica, Colombia |
| *M. russeiclypeatus* (Sakagami & Moure) | southeastern Brazil |
| *M. stenochorus* Engel, n. sp. | Amazonian Peru |
| *M. trichommus* Michener | Colombia |
| *M. truncaticaudus* Michener | Colombia |
| *Baeosphecodes*, n. subgen. | |
| *M. dominicanus* (Stage) | Dominica |
| *M. kittensis* Engel | St. Kitts |
| *M. solitarius* (Ashmead) | St. Vincent |
| *M. thoracicus* (Ashmead) | St. Vincent |
| *M. xaymacensis* Engel | Jamaica |

of hypostomal carinae. Compound eyes generally bare or with sparse, scarcely visible setae, rarely with more elongate setae (more elongate setae are presently known only in *M. trichommus*). Preoccipital area rounded or weakly carinate. Pronotum with horizontal surface poorly defined and narrow medially, rounded medially onto anterior surface; lateral angle angulate, anterior ridge prior to angle carinate or rounded, dorsal ridge rounded, lateral ridge scarcely developed, typically rounded or faintly carinate bordering dorsolateral angle. Anterior border of mesoscutum gently convex, no strongly convex or vertical surface. Mesoscutum and mesoscutellum polished, finely punctate; mesoscutellum not biconvex; propodeum irregularly reticulate-rugose posteriorly; basal area of propodeum slightly shorter to slightly longer than mesoscutellum, semilunar. Legs slender. Forewing with pterostigma enlarged, convex; marginal cell long, apex acute, free part of marginal cell nearly three times as long as part bordering submarginal cells; submarginal cells do not or scarcely extend beyond apex of pterostigma; second and third submarginal cells, when present, each receiving a rs-m crossvein (*M. xaymacensis* Engel has only two submarginal cells). Metasoma polished; first metasomal tergum longer than broad, with no or scarcely any constriction between first and second terga.

♀: Female without scopa; metabasitibial plate completely absent; metatibia without spine-like setae or pegs; inner metatibial spur simple. Pygidial plate narrow, apically rounded, parallel-sided or nearly so, marginal carina scarcely extending onto tergal disc.

♂: Male antenna short, resembling that of female. Metabasitarsus not fused to second metatarsomere. Pygidial plate well defined, broadly or narrowly rounded or subtruncate. Sterna IV–VI with graduli absent or defined only basally, not extending over half distance to margin. Gonobase large; gonocoxae without striations; convex, seta-bearing, ventral gonostylar process short relative to *Sphecodes*, surpassed by expanded dorsal gonostylar process; penis valve slender, with sharp dorsal crest, without ventral prong.

Comments: *Microsphecodes* is most similar to *Nesosphecodes*, both sharing a fine punctation on the head and mesosoma (coarse and closely packed punctation in *Sphecodes*), shortened submarginal cells, very broad clypeus (even more so in *Neso-*

*sphecodes*), absence of vertical pronotal lateral ridge or carina, and absence of a defined mesoscutal anterior vertical surface. The genus differs from *Nesosphecodes* by the extensive yellow, orange, or testaceous areas of integument (entirely black in *Nesosphecodes*), the less broad clypeus (broader in *Nesosphecodes*: *vide* metrics in Engel, 2006a), shorter mandibles (mandibles longer than the compound eyes in *Nesosphecodes*, at most about as long as compound eye in *M. xaymacensis*), the longer subantennal sulci (length only about as long as antennal torular diameter in *Nesosphecodes*), and larger body size (7.8–9.2 mm in length among species of *Nesosphecodes* vs. 3.5–6 mm in *Microsphecodes*).

Key to the Subgenera of *Microsphecodes*

1. Basal area of propodeum striate-foveolate, posteriorly delimited by distinct, strong carina; pubescence of mesosoma prominent, particularly on pleura ..... ..... *Microsphecodes* Eickwort & Stage *s.str*.
—. Basal area of propodeum rugoso-striate, not delimited posteriorly by carina, instead posterior angle rounded; pubescence of mesosoma sparse, particularly on pleura ..... *Baeosphecodes* Engel, n. subgen.

Subgenus *Microsphecodes* Eickwort & Stage

*Sphecodes* (*Microsphecodes*) Eickwort & Stage, 1972: 501. Type species: *Sphecodes* (*Microsphecodes*) *kathleenae* Eickwort in Eickwort & Stage, 1972, by original designation.
*Microsphecodes* Eickwort & Stage; Michener, 1978: 317; Michener, 2000: 366; Michener, 2007: 382.

DIAGNOSIS: Basal area of propodeum striate-foveolate, typically with areolae bordering midline enlarged, posteriorly delimited by distinct, strong carina. Mesosomal and metasomal pubscence generally sparse but setae of pleura fine and numerous.

INCLUDED SPECIES: Aside from the type species, *M. kathleenae*, the subgenus includes *M. russeiclypeatus* (Sakagami & Moure), *M. trichommus*, *M. truncaticaudus*, and *M. stenochorus* n. sp. (Sakagami & Moure, 1962; Eickwort & Stage, 1972; Michener, 1979) (Table 1).

Key to species of *Microsphecodes s.str*.
(Females only)

1. Head and mesosoma entirely dark brown to black except pronotal lobe sometimes testaceous or ferruginous ..... 2
—. Head dark brown or black with clypeus largely to entirely orange, orange-red, or testaceous; mesosoma with large areas of orange, orange-red, or testaceous integument, particularly on pronotum, mesoscutellum, and metanotum, such areas sometimes infuscated ..... 3
2(1). Scape dark brown to black; setae of compound eye absent or scarcely visible; basal area of propodeum with areolae bordering midline not greatly enlarged relative to neighboring areolae (Colombia) ..... *M. truncaticaudus* Michener
—. Scape yellowish red; setae of compound eye prominent, longer than 2 ommatidial diameters; basal area of propodeum with areolae bordering midline greatly enlarged (Colombia) ..... *M. trichommus* Michener
3(1). Basal area of propodeum with areolae on either side of midline distinctly enlarged relative to those between radiating striae; mesoscutum dark brown to black; clypeus very broad, 3.5 or more times as wide as medially long ..... 4

—. Basal area of propodeum with areolae on either side of midline narrow, more similar in size relative to those between radiating striae (Fig. 3); mesoscutum laterally, medioanteriorly, and medioposteriorly orange-red, remainder of surface pitch black with thickened H-shaped appearance (Fig. 1); clypeus not as broad, slightly less than 3 times as wide as medially long (Peru) ..... ..... *M. stenochorus* Engel, n. sp.

4(3). Mesoscutellum orange-red; clypeus 3.5–4 times as wide as medially long (Costa Rica-Colombia) ..... *M. kathleenae* (Eickwort)

—. Mesoscutellum infuscated testaceous; clypeus 4.5 time as wide as medially long (Brazil) ..... *M. russeiclypeatus* (Sakagami & Moure)

***Microphecodes* (*Microsphecodes*) *stenochorus*** Engel, new species

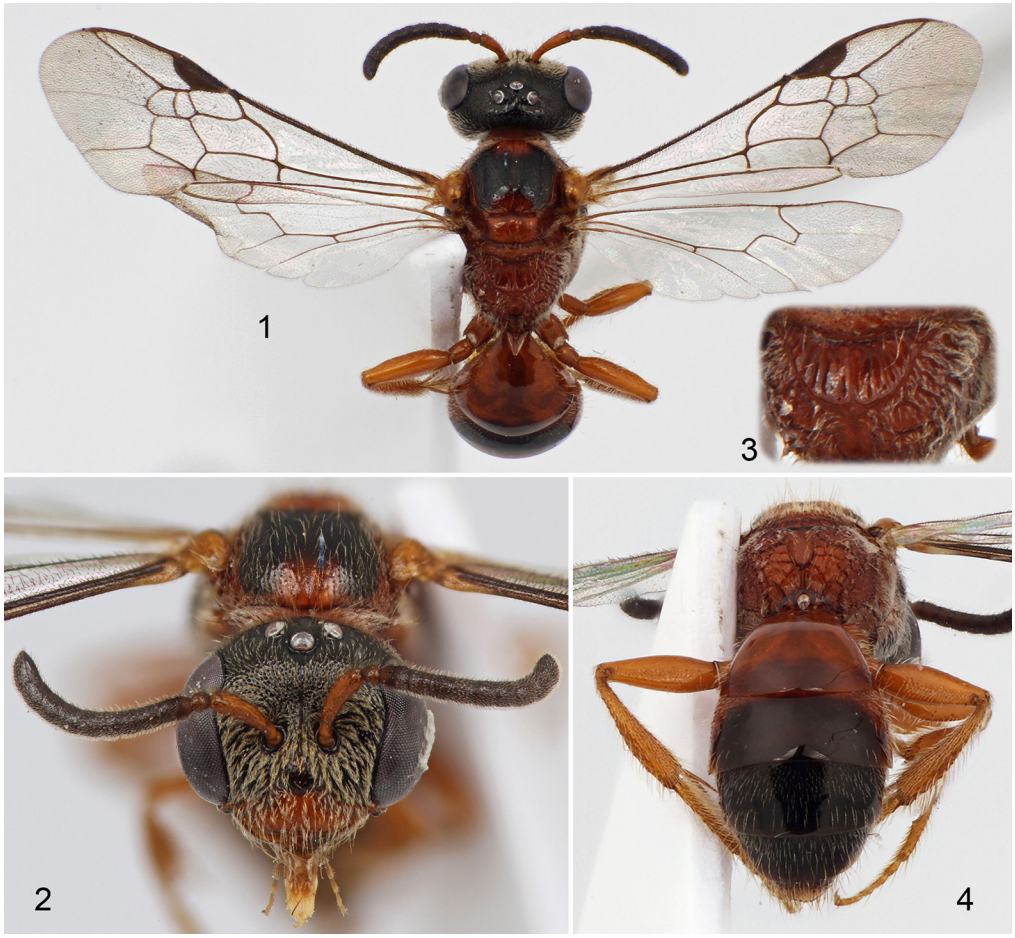
ZooBank: urn:lsid:zoobank.org:act:06903B29-806C-444F-ACAE-7CB78E3D3E83

(Figs. 1–6)

Diagnosis: The new species is most similar to *M. russeiclypeatus* and *M. kathleenae* in terms of overall coloration but differs from them both in the color of the mesoscutum, by the smaller areolae on other side of the midline on the dorsal-facing surface of the propodeum, and the narrower clypeus (2.8 times as wide as medial length in the new species, 3.5–4.5 times as wide as medial length in *M. kathleenae* and *M. russeiclypeatus*). In *M. stenochorus* these areolae are similar in size, particularly width, to the bordering areolae demarcated by the radiating striae, while in the aforementioned species the areolae bordering the midline are greatly enlarged relative to the others. In addition, the mesoscutum of *M. stenochorus* has thin orange-red lateral margins and large, distinctive areas of orange-red medioanteriorly and medioposteriorly, giving the black portion of the surface the appearance of a thickened H-shape.

Description: ♀: Total body length 5.30 mm; forewing length 4.0 mm. Head broader than long (width 1.41 mm, length 1.27 mm as measured from clypeal apex to vertex in facial view). Mandible elongate, without subapical tooth, slightly shorter than compound eye length. Clypeus 2.8 times broader than long (width 0.75 mm, medial length 0.17 mm). Frontal line carinate from lower tangent of antennal toruli to point above upper tangent of toruli equivalent to 2.5 times torulus diameter. Upper interorbital distance 0.89 mm; lower interorbital distance 0.78 mm; inner margin of compound eye slightly concave just above level of antennal toruli. Gena only slightly narrower than compound eye in profile. Intertegular distance 0.84 mm. Inner metatibial spur simple. Forewing venation as in figure 6; hind wing with five distal hamuli arranged in a single series.

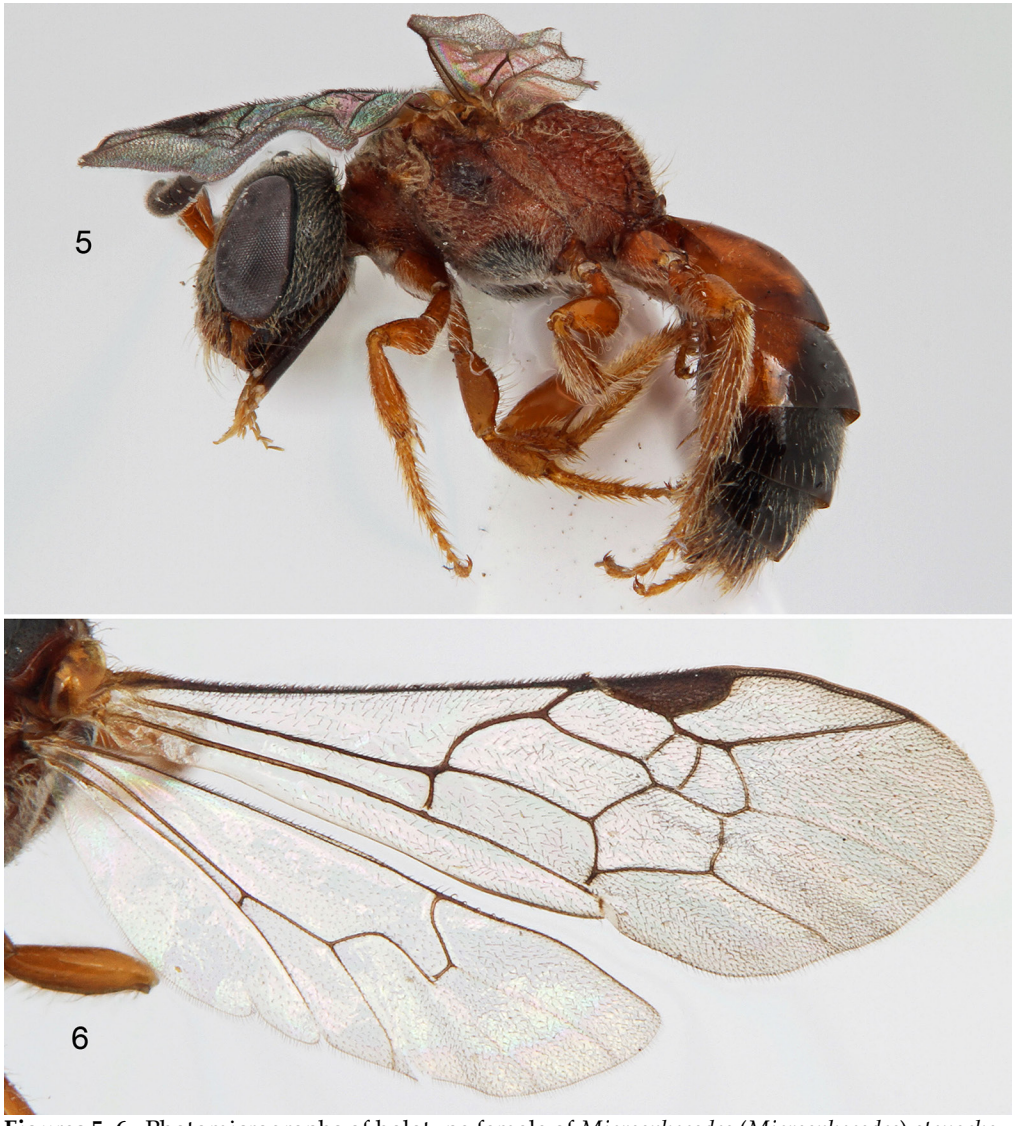
Integument generally shining. Clypeus smooth with shallow, coarse punctures separated by less than a puncture width; supraclypeal area smooth with small punctures separated by 0.5–2 times a puncture width; remainder of head smooth and distinctly punctate, punctures separated by less than a puncture width, becoming slightly more widely spaced in ocellocular area, punctures sparser around ocelli and on vertex; gena smooth with punctures separated by 1–2 times a puncture width; postgena imbricate and impunctate. Pronotum smooth with shallow, faint punctures separated by less than a puncture width. Mesoscutum smooth with punctures separated by a puncture width or a little less anteriorly, separated by less than a puncture width lateral to parapsidal lines and along posterior margin, and sparse over disc, separated by 2–5 times a puncture width; tegula impunctate and exceedingly faintly imbricate; mesoscutellum smooth and almost impunctate over disc, small punctures separated




**Figures 1–4.** Photomicrographs of holotype female of *Microsphecodes* (*Microsphecodes*) *stenochorus*, new species, from Abujao, Ucayali, Peru. **1.** Dorsal habitus. **2.** Facial view. **3.** Detail of dorsal-facing surface of propodeum. **4.** Posterior view.

by less than a puncture width along extreme lateral and posterior borders; metanotum smooth with shallow punctures separated by a puncture width or less. Pleura smooth with shallow, coarse punctures separated by less than a puncture width. Basal area of propodeum striate-foveolate, strong striae radiating from basal margin and defining distinct areolae (Fig. 3), areolae bordering midline not greatly enlarged relative to neighboring areolae, posteriorly delimited by a strong carina (Fig. 3), integument between striae smooth and shining; lateral and posterior surfaces of propodeum smooth with irregular rugae (Fig. 4). Metasomal terga smooth, virtually impunctate except sparse (Fig. 4), faint, minute punctures associated with base of setae in basal halves of more apical terga; first and second sternum smooth, remaining sterna very faintly imbricate.

Mandible orange, with reddish apex; labiomaxillary complex dark brown except palpi and glossa yellow; clypeus orange-red (Fig. 2); supraclypeal area black with small faint reddish spot medially at peak; remainder of head black; scape orange-red; pedicel and first flagellomere reddish brown, remainder of flagellum dark brown (Figs. 1, 2). Mesosoma largely ferruginous (Figs. 1, 3–5) except with black patches on




**Figures 5–6.** Photomicrographs of holotype female of *Microsphecodes* (*Microsphecodes*) *stenochorus*, new species, from Abujao, Ucayali, Peru. **5.** Lateral habitus. **6.** Wing venation.

upper mesepisternum, lower and ventral mesepisternum (Fig. 5), and mesoscutum except laterally, medioanteriorly, and medioposteriorly orange-red, forming a thickened H-shape (Figs. 1, 2). Wing veins dark brown; wing membrane hyaline (Fig. 6). Legs orange-red. First metasomal tergum orange-red, basal and lateral portions of second tergum orange-red, remaining terga dark brown (Fig. 4); first sternum orange-red; second sternum reddish brown; remaining sterna dark brown.

Pubescence relatively sparse and fine (Figs. 1, 5), generally white except somewhat yellow on face, pro- and mesotibiae, pro- and mesotarsi, and metasoma. Setae generally simple and erect, some with minute branches; face with moderately-dense, appressed, short, plumose setae on lower face (Fig. 2); preëpisternum and anterior mesepisternum with moderately-dense whitish, plumose setae (Fig. 5).

♂: Unknown.

HOLOTYPE: ♀, Peru, UC [Ucayali], Coronel Portillo, Calleria, Abujao, 08°19′34.32′′S/73°39′58.7′′W, 195 m, 23–25.iv.2013 [23–25 April 2013], L. Sulca (MUSM).

ETYMOLOGY: The specific epithet is a combination of the Greek words *stenos* (meaning, "narrow") and *chora* (meaning, "room"), and is a reference to the areolae on the dorsal-facing surface of propodeum.

***Baeosphecodes*** Engel, new subgenus

ZooBank: urn:lsid:zoobank.org:act:C4FA5614-EEEC-4E51-A1B0-14ED22FCA95B

TYPE SPECIES: *Sphecodes* (*Microsphecodes*) *dominicanus* Stage in Eickwort & Stage, 1972.

DIAGNOSIS: Basal area of propodeum rugoso-striate, not delimited posteriorly by carina, posterior border rounded. Mesosomal and metasomal pubscence generally sparse, particularly on pleura.

ETYMOLOGY: The new genus-group name is a combination of *baios* (Greek, meaning "scanty", in reference to the sparser pubescence of these species relative to *Microsphecodes s.str*.) and *Sphecodes*, type genus of the Sphecodina. The name is masculine.

INCLUDED SPECIES: The subgenus presently includes five species: *M. domincanus* (Stage), *M. kittensis* Engel, *M. solitarius* (Ashmead), *M. thoracicus* (Ashmead), and *M. xaymacensis* (Ashmead, 1900; Eickwort & Stage, 1972; Engel, 2006b, 2011) (Table 1).

Key to species of *Baeosphecodes*

(Females only)

1. Mesosoma entirely or at least partially black to darkly infuscate ..... 2
—. Mesosoma entirely orange-testaceous (Jamaica) ..... *M. xaymacensis* Engel
2(1). Mesoscutum, mesoscutellum, metanotum, and propodeum concolorous, black ..... 3
—. Mesonotal sclerites of contrasting coloration ..... 4
3(2). Pronotum and mesosternum testaceous, remainder of mesosoma black (St. Vincent) ..... *M. solitarius* (Ashmead)
—. Mesosomal dorsum black, pleura infuscated, venter testaceous (Dominica) ..... ..... *M. dominicanus* (Stage)
4(2). Mesoscutellum and metanotum pitch black; propodeum yellow (St. Kitts) ..... ..... *M. kittensis* Engel
—. Mesoscutellum and metanotum orange-testaceous, sometimes infuscated; propodeum darkly infuscate (St. Vincent) ..... *M. thoracicus* (Ashmead)

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REFERENCES

Ashmead, W.H. 1900. Report upon the aculeate Hymenoptera of the islands of St. Vincent and Grenada, with additions to the parasitic Hymenoptera and a list of the described Hymenoptera of the West Indies. *Transactions of the Entomological Society of London* 48(2): 207–367.

Eickwort, G.C., & K.R. Eickwort. 1972. Aspects of the biology of Costa Rican halictine bees, III. *Sphecodes kathleenae*, a social cleptoparasite of *Dialictus umbripennis* (Hymenoptera: Halictidae). *Journal of the Kansas Entomological Society* 45(4): 529–541.

Eickwort, G.C., & G.I. Stage. 1972. A new subgenus of Neotropical *Sphecodes* cleptoparasitic upon *Dialictus* (Hymenoptera: Halictidae, Halictinae). *Journal of the Kansas Entomological Society* 45(4): 500–515.

Engel, M.S. 2001. A monograph of the Baltic amber bees and evolution of the Apoidea (Hymenoptera). *Bulletin of the American Museum of Natural History* 259: 1–192.

Engel, M.S. 2006a. A new genus of cleptoparasitic bees from the West Indies (Hymenoptera: Halictidae). *Acta Zoologica Cracoviensia* 49B(1–2): 1–8.

Engel, M.S. 2006b. A new species of *Microsphecodes* from St. Kitts (West Indies) (Hymenoptera: Halictidae). *Mitteilungen des Internationalen Entomologischen Vereins* 31(1–2): 51–54, +1 pl.

Engel, M.S. 2006c. The *Sphecodes* of Cuba (Hymenoptera: Halictidae). *Acta Zoologica Cracoviensia* 49B(1–2): 73–78.

Engel, M.S. 2011. A new species of *Microsphecodes* from Jamaica (Hymenoptera, Halictidae). *ZooKeys* 111: 33–40.

Habermannová, J., P. Bogusch, & J. Straka. 2013. Flexible host choice and common host switches in the evolution of generalist and specialist cuckoo bees (Anthophila: *Sphecodes*). *PLoS ONE* [*Public Library of Science ONE*] 8(5): [1–16] e64537.

Michener, C.D. 1978. The parasitic groups of Halictidae (Hymenoptera, Apoidea). *University of Kansas Science Bulletin* 51(10): 291–339.

Michener, C.D. 1979. New and little-known halictine bees from Colombia (Hymenoptera: Halictidae). *Journal of the Kansas Entomological Society* 52(1): 180–208.

Michener, C.D. 2000. *The Bees of the World*. Johns Hopkins University Press; Baltimore, MD; xiv+[i]+913 pp., +16 pls.

Michener, C.D. 2007. *The Bees of the World* [2nd Edition]. Johns Hopkins University Press; Baltimore, MD; xvi+[i]+953 pp., +20 pls.

Michener, C.D., M.D. Breed, & W.J. Bell. 1979. Seasonal cycles, nests, and social behavior of some Colombian halictine bees (Hymenoptera; Apoidea). *Revista de Biología Tropical* 27(1): 13–34.

Sakagami, S.F., & J.S. Moure. 1962. *Sphecodes russeiclypeatus*, n. sp., obtido de um ninho de *Dialictus* (*Chloralictus*) *seabrai* (Moure, 1956) (Hymenoptera-Apoidea). *Boletim da Universidade do Paraná, Zoologia* 1(18): 1–6.

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